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The explanation is the same. The true explanation of abnormal perception thus throws light on normal perception.

The Law of Similarity is also shown to be non-operative in recognition proper (*vide* the article "Recognition" in this number).

The prevalent teaching concerning "Assimilation" (Wundt, Bain, Mill, Dewey, *et. cet.*), is shown to be incorrect and contradictory to the facts in as far as it is said to involve the action of a law of similarity.

The different meanings and grades of similarity are taken up and shown to be unclear and confusing. The different cases of alleged association by similarity are shown to be analyzable into cases of association by contiguity.

The Law of Interest (Hamilton) is then examined in reference to and as an integral part of attention.

ARTHUR ALLIN.

*Ueber den Einfluss von Gesichtsassociationen auf die Raumwahrnehmungen der Haut.* Von MARGARET FLOY WASHBURN. Erweiterter Abdruck aus Wundt, *Philosoph. Studien*, XI Bd., 2 Heft. Leipzig, 1895, pp. 60. Doctor's Dissertation, Cornell University, 1894.

The important thesis which this paper supports is that the localization of tactual sensations in persons of normal powers of visualization is not immediate, but to a greater or less extent by means of visual associations. In other words, when asked to locate a point of the skin previously touched by the experimenter, the subject does so by means of a visual map of the part of the body in question. The fullness and accuracy of the visual map probably differ from man to man and for different bodily areas in the same man, areas which present strongly marked foldings of the skin (as at the joints) or the boundary lines of the members being represented with particular clearness and detail.

The first part of Miss Washburn's study is devoted to a careful survey of important literature from Weber (who seems once to have almost had this idea) through Czermak, Goltz, Volkmann, Vierordt's pupils, Fechner, Camerer and Goldscheider to Henri. In this the new conception justifies itself again and again by its power of explanation. It gives a reason "(a) for the greater distinctness of horizontal distances on the extremities as compared with vertical (Weber); (b) for Volkmann's observation of the rapid progress of practice and its bilateral effect; (c) for Camerer's observation that the equivalence relation between two parts [as determined by his method] approaches nearer to unity than that established between the same parts by other methods; (d) possibly also for the results of Henri's experiments with localization on a photograph, which show that the localization error on the hand and wrist is smaller in the neighborhood of the folds and always occurs in the direction of the nearest folds." It also seems probable that visualization combined with anatomical conditions accounts for the greater sensitivity of the smaller parts of the body (according to Weber), or the more mobile parts (according to Vierordt), and for the superior discriminative powers of children observed by Czermak.

The second part of the paper contains the author's own experiments. These were made upon five subjects, two who were good visualizers, two whose powers were only moderate in this direction, and one, a woman of fifty, who had been blind since her fifth year, and who thus furnished an interesting counterpiece to the normal subjects. An apparently unavoidable difficulty in approaching the matter experimentally lies in the im-

possibility of getting on the same individual results both with and without the visual component. This is partly met by the experiments on the blind subject, but robs those on the other subjects of some of their directness. The results, however, are in general satisfactory. For details the reader is referred to the original. Volkmann's bilateral effect of practice was not found, possibly because the experiments on this point were not numerous enough and long enough continued. The bilateral effect was strongly marked in the experiments of Dresslar (this JOURNAL VI, pp. 325 ff.). Of incidental observations the following are interesting: the duality of the stimulus in Weber's circle experiments is easier to recognize than the relative direction of the points; the direction is better recognized when a straight edge of length equal to the separation of the points is substituted for them; the blind subject tended to underestimate the breadth of her arm as compared with its length—an effect possibly due to muscular associations.

The third part of the paper is given to a discussion of the psychology of the methods employed, and contains interesting observations on the effect of expectation and of the introduction of blank experiments (*Nullversuche*), i. e., tests whose object is to assure the operator of the state of the subject's attention.

That some such intervention of visual images as the author describes does take place in his own case, is clear to the introspection of the reviewer—certainly in cases where the grade of attention is high. The only wonder is that what seems so obvious and important should have been missed by the many distinguished investigators who have previously worked upon skin sensations. The author refrains from extending her principle of visualization beyond skin sensations, but it doubtless has a much wider scope. In experiments in the Clark laboratory made in the spring of 1895, and upon quite another topic, it incidentally appeared that visualization affected the subject's notion of his posture. The question naturally suggests itself whether there are not other vicarious functionings among the senses, and in general what the mutual relations of the senses are. Indeed, Miss Washburn's suggestion is so wide in possible development as almost to promise a new chapter in experimental psychology.

E. C. S.

*Die Umwälzung der Wahrnehmungshypothesen durch die mechanische Methode. Nebst einem Beitrag über die Grenzen der physiologischen Psychologie.* Von DR. HERMANN SCHWARZ. Leipzig, 1895, pp. xx-213.

This work consists of three treatises, related to each other only by the fact that they deal with theories of perception. The first—*"Das Problem des unmittelbaren Erkennens"*—traces the development of the general problem of perception from Democritus and Aristotle to Descartes and Hobbes. The second—*"Das Problem der Sinnesqualitäten"*—gives a discussion of the theories of the perception of sensory qualities in Hobbes and Descartes, as compared with the theories of the Greeks and scholastics. The third—*"Ueber die Grenzen der physiologischen Psychologie"*—is a critique of Exner's attempt to explain consciousness on purely physiological grounds. Although not logically connected, the arguments of the first two parts are so similar that we need not give them separate treatment here. Both alike trace the development of perception from the Greeks to Hobbes.